NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

June 27, 2018

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Chief Medical Officer

A. ACCIDENT: ERA18FA004; Salters, SC

On October 4, 2017, about 1745 eastern daylight time, a Cessna 401B, N401HH, was destroyed after it impacted terrain while maneuvering near Salters, South Carolina. The commercial pilot and a passenger were fatally injured. Visual meteorological conditions prevailed and no flight plan was filed for the local flight. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

   This investigation was performed to evaluate the pilot for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

   The FAA medical case review, autopsy report, toxicology findings, records from the pilot's most recent primary care doctor, and the investigator's reports were reviewed.

   FAA Medical Case Review

   According to the FAA medical case review, the 66 year old male pilot had reported 15,000 total hours of flight experience as of his last aviation medical exam, dated 7/27/2017. At that time, he was 70 inches tall and weighed 180 pounds. He had reported a knee replacement and cataract surgery as well as ongoing treatment for rheumatoid arthritis, gout, hypertension, and high cholesterol to the FAA. At the time of his last exam, he reported using hydroxychloroquine for his arthritis, colchicine

for gout, amiloride, nifedipine, and hydrochlorothiazide for his blood pressure, and rosuvastatin for his cholesterol. None of these are considered impairing. No abnormalities were noted on the physical exam and he was issued a second class medical certificate limited by a requirement to have available glasses for near vision.

Autopsy

According to the autopsy performed by Medical University of South Carolina, Department of Pathology and Lab Medicine, the cause of death was multiple blunt force injuries and the manner of death was accident. The brain was not examined due to the extent of injury. No significant natural disease was described.

Toxicology

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified ethanol at 0.185 gm/dl in urine and at 0.210 gm/dl in cavity blood. N-propanol was also found in cavity blood. In addition, colchicine, 0.122 ug/ml of diphenhydramine, donepezil, and hydroxychloroquine, were identified in cavity blood. All of these and acetaminophen, benazepril, naproxen, and rosuvastatin were identified in urine.

Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system depressant. After ingestion, at low doses, it impairs judgment, psychomotor functioning, and vigilance; at higher doses it can cause coma and death. The effects of ethanol on aviators are generally well understood; it significantly impairs pilots' performance, even at very low levels.[1] Federal Aviation Regulations, Section 91.17 (a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.[2] Because ingested alcohol is distributed throughout the body, levels from different post mortem tissues are usually similar after ingestion. Ethanol may also be produced in body tissues by microbial activity after death.[3] If produced post mortem, ethanol levels may vary significantly from one specimen to the next. N-propanol is another alcohol that can be produced in post mortem tissues.

Colchicine is a prescription medication used to treat and prevent attacks of gout.

[1] Cook, C.C., Alcohol and aviation. Addiction (Abingdon, England), 1997; 92(5): 539-555.
[2] US Government Printing Office .eCFR- Code of Federal Regulations. 91.17. http://www.ecfr.gov/cgi-bin/text-idx?rgn=div8&node=14:2.0.1.3.10.1.4.9. Accessed 6/16/2016.
[3] Federal Aviation Administration. Forensic Toxicology Drug Information. Ethanol. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60 Accessed 12/02/2016.

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. It is available over the counter under the trade names Benadryl and Unisom. Diphenhydramine carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery). Compared to other antihistamines, diphenhydramine causes marked sedation; this is the rationale for its use as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed. In fact, in a driving simulator study, a single dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.100%.[4] The therapeutic range for diphenhydramine is 0.0250 to 0.1120 ug/ml.[5] Diphenhydramine undergoes post mortem redistribution where after death, the drug can leech from storage sites back into blood. Central post mortem levels may be about two to three times higher than peripheral levels.[6]

Donepezil is a prescription medication often marketed with the name Aricept and used to slow the progression of cognitive decline in Alzheimer's disease.[7] While it is not considered impairing, the underlying disease is.

Hydroxychloroquine is an antimalarial medication that has anti-inflammatory properties which lead to its use in the treatment of rheumatoid arthritis. It is not considered cognitively impairing.[8]

Acetaminophen is an analgesic available over the counter, commonly marketed with the name Tylenol. Benazepril is a blood pressure medication.[9] Naproxen is an anti-inflammatory drug available over the counter and commonly marketed with the names Naprosyn and Aleve. Rosuvastatin is a cholesterol lowering medication commonly marketed

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[4] Weiler JM, B.J., Woodworth GG, Grant AR, Layton TA, Brown TL, McKenzie DR, Baker TW, Watson GS., Effects of fexofenadine, diphenhydramine, and alcohol on driving performance. A randomized, placebo-controlled trial in the Iowa Driving Simulator. Ann Intern Med. 2000;132(5): 354-63.
[5] Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Diphenhydramine. http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50 Accessed 03/13/2018.
[6] Han E, Kim E, Hong H, Jeong S, Kim J, In S, Chung H, Lee S. Evaluation of postmortem redistribution phenomena for commonly encountered drugs. Forensic Sci Int. 2012;219(1-3):265-71.
[7] National Institutes of Health. US National Library of Medicine. DailyMed. Donepezil. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=11ac01f4-d26e-47b2-9660-d514ab097fdb Accessed 6/27/2018.
[8] National Institutes of Health. US National Library of Medicine. DailyMed. Hydroxychloroquine. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=452092b4-7a8f-4d19-8113-f1c2a948d3d8 Accessed 6/27/2018.
[9] National Institutes of Health. US National Library of Medicine. DailyMed. Benazepril. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a216253b-27cb-42ef-b5a8-67fb05aafb88 Accessed 6/27/2018.

with the name Crestor.[10] None of these substances are considered impairing.

Personal Medical Records

According to records obtained from the pilot's most recent primary care physician, he initiated care with the doctor on February 2, 2017. No documentation of any complaint other than an annual physical and a need for a colonoscopy was recorded. In the review of systems, the physician noted, "no memory loss." The physician performed a mini-mental status exam and the pilot scored 28/30 points. He recalled only one of three objects after 5 minutes. The physician diagnosed "memory loss" but did not perform other testing. Prescribed medications included colchicine, rosuvastatin, hydroxychloroquine, nifedipine (a blood pressure medication) and trazodone. Trazodone is a sedating antidepressant that is often prescribed at bedtime for insomnia. It carries this warning, "Trazodone may cause somnolence or sedation and may impair the mental and/or physical ability required for the performance of potentially hazardous tasks. Patients should be cautioned about operating hazardous machinery, including automobiles, until they are reasonably certain that the drug treatment does not affect them adversely."[11]

Three months later, on April 27, 2017 the patient returned to the doctor for "an annual physical" and complaints of "generalized osteoarthritis." According to the review of systems, the pilot denied episodes of weakness, loss of consciousness, memory impairment, difficulty concentrating or any other neurologic or psychiatric issues. His neurologic exam was documented as normal. However, he was diagnosed with essential tremor, memory loss, and transient ischemic attack as well as hypertension, which was elevated at this exam to 160/88. The physician added another blood pressure medication and prescribed donepezil for memory loss.

D. SUMMARY OF MEDICAL FINDINGS

The 66 year old male pilot in this accident had reported a knee replacement and cataract surgery as well as ongoing treatment for rheumatoid arthritis, gout, hypertension, and high cholesterol to the FAA. At the time of his last exam, dated 7/27/2017, he reported using hydroxychloroquine for his arthritis, colchicine for gout, amiloride, nifedipine, and hydrochlorothiazide for his blood pressure, and rosuvastatin for his cholesterol. None of these are considered impairing.

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[10] National Institutes of Health. US National Library of Medicine. DailyMed. Rosuvastatin. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=134c5455-5171-66f3-e0c4-c475978ffb22 Accessed 6/27/2018.

[11] National Institutes of Health. US National Library of Medicine. DailyMed. Trazodone. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=43d4be17-5fae-4326-a5c4-9e25e2db6a43 Accessed 6/27/2018.

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Personal medical records from a few months prior to his last aviation medical examination documented the pilot was also being treated with the sedating antidepressant trazodone for insomnia and beginning in April 2017 he had been prescribed donepezil for memory loss.